

# Assignment 2: Transformations & Tone Mapping

## Group members:

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## Exercises solved:

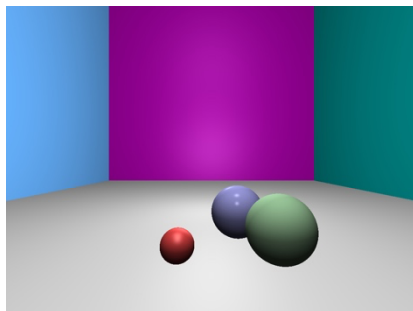
We solved all three exercises.

**Exercise 1:** Implemented plane-ray intersection and added 6 planes as a “box” to the scene.

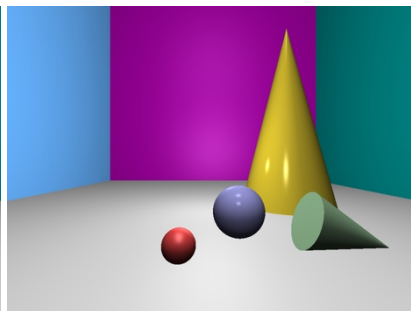
**Exercise 2:** Implemented cone-ray intersection (closed cone), implemented transformations. Placed the two cones accordingly.

**Exercise 3:** Updated lighting – tone mapping, gamma correction, attenuation; Played around with parameters to inspect what they change in the final rendering.

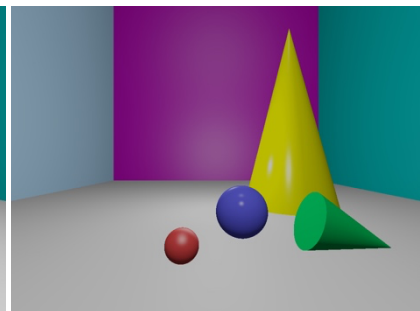
## Our results :



Exercise 1



Exercise 2



Exercise 3

## Encountered problems:

**Exercise 1:** none

**Exercise 2:** At first, we had some difficulty with fully understanding the theoretical foundations. After revising them, the implementation was successful. Our approach for the closed cone was to first conduct a plane intersection (only accepting a hit if it is within the cone's radius). After that, we make an intersection with the infinite cone and check if the intersection point is within the defined y limit.

Something that we had to reconsider was the handling of the case where the ray intersects the cone at two points. There is a scenario, where the first intersection is not within the y

limit, but the second intersection is. Initially, we did not handle this case correctly and discarded the second intersection too early, before making the check if the first intersection is within the y limit. That would lead to returning a miss, which is incorrect. It took us some time to correctly arrange all operations, so this is handled correctly. Now it works as intended.

**Exercise 3:** After implementing the lighting, all colors in the image were much weaker, which makes sense as we essentially reduce the light intensity at some steps. We played around with the parameters in the tone mapping and attenuation, as well as the ambient light to improve the image quality. We reduced the ambient light and increased the three light sources. The largest impact had the changing of the materials' diffuse and ambient values. Because of the reduced color intensities, we used brighter colors to improve the overall visual result. We tried to achieve more brightly displayed colors while keeping the original color values, but had little success.

**Declaration of AI use:** We created a header file with color names and their corresponding RGB values. This list of colors was created with ChatGPT. No other code was created with AI or similar tools.